The Mars Surveyor Program Lander Missions

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NASA and the Jet I'repulsion Laboratory are in the process of establishing a multi-year program to observe Mars using instrumentation on-board orbital, surface, and possibly airborne (balloon, airplane) platforms. 1 his new Mars observation effort, designated the Mars Surveyor Program, initially will focus orr the recovery of the original Mars Observer science objectives with orbiters launched during the 1996 and 1998 Mars transfer opportunities. Current planning calls for the initiation of the surface segment of the Mars Surveyor Program with the launch of a single Mars lander during the 1998 opportunity. Additional landers, orbiters, and, and airborne vehicles will be launched during each successive Mars transfer opportunity as appropriate anti affordable to establish an ongoing investigation of Mars.

1 ho landers comprising the surface segment of the Mars Surveyor Progran-r will be evolved versions of NASA's Mars E nvironmental Survey (MESUR) Pathfinder spacecraft. Pathfinder currently is on schedule for a December 1996 launch with the primary objective of demonstrating the critical cruise, entry, descent, and landing technologies required for the low cost implementation of Mars lander missions. In order to accomplish significant surface science while satisfying the low life cycle cost constraints, it is imperative to reduce the size of the lander spacecraft significantly while maintaining technical heritage to f'athfinder. T he Pathfinder launch mass of 700 kg must be reduced by a minimum of 40°/0 for spacecraft launched in 1998 and beyond to allow launch on the planned Medium-lite launch vehicle and/or to allow multiple spacecraft to be launched by a single Delta vehicle. T he required mass reduction will be accomplished through the development and application of advanced microelectronic, microinstrument, and composite structure technologies. Technical heritage 10 Pathfinder will be maintained by utilizing the passive entry, descent, and landing approach demonstrated by Pathfinder.

The original surface science objectives for the series of landers following Pathfinder, designated the MESUR Network, involved the establishment of a global network of stations designed to perform concurrent seismic, meteorlogical, and geoscience measurements over a full martian year. A network mission involving a large number of landers currently is affordable only in the context of an international program to explore Mars. 1 he U.S. is actively participating in the International Mars Exploration Working Group to help define the role of the Mars Surveyor Program in an international investigation of the Martian environment. Instrument selection for the landers comprising the surface segment of the Mars Surveyor Program will be selected through NASA's Announcement of Opportunity (AO) process. T he initial AO for the 1998 lander instruments is scheduled for release at the end of 1994 with selection in the spring of 1995.

T his paper discusses the programmatic and technical approaches and challenges to implementing the surface and airborne segments of the Mars **Surveyor Program.**